
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF BIOLOGICAL SURVEY

**FOOD HABITS OF A GROUP OF
SHOREBIRDS: WOODCOCK, SNIPE
KNOT, AND DOWITCHER**

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SHOREBIRDS: WOODCOCK, SNIPE
KNOT, AND DOWITCHER

BY
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ABSTRACT

American woodcock (*Philohela minor*).—Contents of 261 of 278 stomachs analyzed were used to compute volumetric food percentages. Animal food, 89.46 percent, consisted predominantly of earthworms, 67.81 percent. Insects, 18.31 percent, chiefly aquatic fly larvae, beetles, and caterpillars, ranked second. Other animal food, 3.34 percent, including crustaceans, myriapods, salamanders, a frog, and a snail, was unimportant. Plant food, 10.54 percent, was mostly debris of secondary origin, although seeds of a great variety of marsh and aquatic plants were taken.

Wilson's snipe (*Capella delicata*).—Contents of 766 of 830 stomachs analyzed were used to compute volumetric food percentages. Animal food, 83.22 percent, was composed largely of insects, 49.30 percent, chiefly aquatic fly larvae and beetles, although dragonfly nymphs and bugs were of value. Crustaceans, 11.70 percent; earthworms, 11.30 percent; and mollusks (mainly fresh-water snails), 6.68 percent, were also significant. Fishes, 2.59 percent, and other animal food, 1.65 percent, made up of spiders, beetle mites, clamworms, leeches, salamanders, tadpoles, young frogs, and lizards, were of slight importance. Plant food, 16.78 percent, consisted mainly of seeds of marsh and aquatic plants, largely sedges (*Scirpus*, *Carex*, and *Mariscus* chiefly) and bogbean (*Menyanthes trifoliata*).

American knot (*Calidris canutus rufus*).—Contents of 219 of 226 stomachs analyzed were used to compute volumetric food percentages. Animal food, 84.83 percent, consisted largely of mollusks, 59 percent, chiefly univalves, with predaceous mud snails most important, although a bivalve (*Donax*) was the principal item in many stomachs. Insects, 14.80 percent, predominantly flies, but including a number of aquatic beetles, were next in value. Crustaceans, 6.86 percent, were usually small forms of no economic importance. King crab eggs, 2.02 percent, found only in summer stomachs, and other animal food, 2.15 percent, comprising a few small fishes, marine worms, and spiders, had little significance. Plant food, 15.17 percent, was composed largely of seeds of marsh and aquatic plants, mainly wigeongrass (*Ruppia*), bogbean, and goosefoot (*Chenopodium*).

Eastern dowitcher (*Limnodromus griseus griseus*).—Contents of 191 of 198 stomachs analyzed were used to compute volumetric food percentages. Animal food, 87.89 percent, contained three important groups: Insects, 29.08 percent, largely flies (including many chironomids and soldier flies, Stratiomyidae) and water beetles; marine worms (mainly destructive clamworms, *Nereis*), 27.37 percent, the largest percentage of this food so far known for any bird; and mollusks (mostly snails, the coffee bean snail, *Melampus*, predominating), 20.88 percent. Less important were crustaceans, 6.14 percent; king crab eggs, 3.27 percent; and other animal food, 1.15 percent, which comprised a few small fishes, spiders, and fragments of a hydroid. Plant food, 12.11 percent, was composed mainly of seeds of marsh and aquatic plants, principally bulrushes (*Scirpus*), and bayberry (*Myrica*).

Long-billed dowitcher (*Limnodromus griseus scolopaceus*).—Contents of 99 of 107 stomachs analyzed were used to compute volumetric food percentages. Animal food, 85.98 percent, consisted predominantly of insects, 70.97 percent, mainly flies (chironomids chiefly) and water beetles. Crustaceans, 7.72 percent; mollusks, 3.89 percent; and marine worms, 3.24 percent, were fairly important. Other animal food, 0.16 percent, including spiders and a few fish remains, was insignificant. Plant food, 14.02 percent, contained much vegetable debris but mostly seeds of a great variety of aquatic plants, mainly bulrushes (*Scirpus*) and pondweeds (*Potamogeton*).

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FOOD HABITS OF A GROUP OF SHOREBIRDS WOODCOCK, SNIPE, KNOT, AND DOWITCHER

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INTRODUCTION

This bulletin presents a detailed report of the food habits, as determined from stomach examinations, of five North American shorebirds of four species—the American woodcock, Wilson's snipe, the American knot, and the eastern and long-billed dowitchers—and brief notes on two Old World species—the European woodcock and the great snipe—that are stragglers in North America.

The North American species treated differ considerably from each other in habitat. Wilson's snipe and the dowitchers occur from coast to coast and are known to all persons familiar with the bird life of prairie lakes, inland marshes, or the seashore; the American knot is common only on the beaches and tidal flats of the Atlantic coast; and the American woodcock inhabits thickets and wooded slopes throughout the eastern half of the United States.

Formerly these birds were considered legitimate game and not only were sought by sportsmen but were taken in excessive numbers by the pothunter who was shooting for the market. At present, under regulations promulgated under the Migratory Bird Treaty Act of 1918, the American knot and dowitchers are among birds protected at all times and the American woodcock and Wilson's snipe may be taken only during open seasons.¹ The latter two birds are favorites of hunters, and their savory flesh is highly acceptable at any table. Because of their swift and irregular flight, they probably furnish sport to a greater number of hunters with less loss of birds concerned than any other game bird.

In addition to their food and sport value and their esthetic and recreational worth all the birds treated in this bulletin have some economic importance in that they consume both injurious and beneficial forms of life. The woodcock subsists chiefly on earthworms,

¹ For information on open seasons for shorebirds, inquire either of the Bureau of Biological Survey, Washington, D. C., or of the game officials of the State or States concerned.

one of the intermediate hosts of the gapeworm of chicks, and occasionally feeds extensively upon cutworms and other harmful insects. Wilson's snipe, the knot, and the dowitchers, each in its own way, may at times do appreciable good. Their insect food contains more injurious than beneficial species, and clamworms, which are reputed to be active enemies of oysters and other valuable shellfishes, furnish more than one-fourth of the eastern dowitcher's food. Although some of these birds eat a few small fishes, the forms taken are not those of value for human food and the total consumed is insignificant. The crustaceans and mollusks eaten are also small forms of no economic importance.

To determine the foods eaten by the 5 North American shorebirds, the contents of 1,639 stomachs were examined by the volumetric method in the Food Habits laboratories of the Biological Survey at

TABLE 1.—Food and gravel, by volumetric percentages, found in 1,536 stomachs of 5 shorebirds

Item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long- billed dowitcher
	Number 261	Number 766	Number 219	Number 191	Number 99
Stomachs used -----					
Animal food:	Percent	Percent	Percent	Percent	Percent
Annelida:					
Polychaeta (Chaetopoda) (marine worms) -----			0.54	27.37	3.24
Oligochaeta: Lumbricidae (earthworms) -----	67.81	11.30			
Crustacea (crustaceans) -----	1.02	11.70	6.86	6.14	7.72
Xiphosura: <i>Limulus polyphemus</i> (king crab) -----			2.02	3.27	
Arachnida (spiders) -----	.68	.45	.34		.16
Myriapoda (millepedes and centipedes) -----	.94				
Insecta (insects): ¹					
Orthoptera (grasshoppers, crickets) -----		1.85			
Neuroptera: Sialidae (dobson flies) -----		1.49			
Ephemeroptera (Mayflies) -----		.46			
Odonata (dragonflies) -----		5.01	.24	1.12	1.09
Hemiptera (true bugs):					
Corixidae (water boatmen) -----				.83	.91
Miscellaneous and undetermined -----		3.03	.18		
Coleoptera (beetles):					
Carabidae (ground beetles) -----	3.13	2.72	.77		
Staphylinidae (rove beetles) -----	.71				
Elateridae (click beetles) -----	1.08				
Scarabaeidae (lamellicorn beetles) -----	.51	.85			
Aquatic beetles -----		11.42		8.26	6.81
Miscellaneous and undetermined -----	.75	.88	.40	.66	3.82
Trichoptera (caddisflies) -----		.43			
Lepidoptera (caterpillars, moths) -----	3.29	.89			
Diptera (flies):					
Chironomidae (midges) -----				5.65	41.83
Miscellaneous and undetermined -----	6.85	20.20	12.69	12.35	16.50
Hymenoptera (ants, parasitic wasps) -----	.54	.07	.47		
Mollusca (mollusks) -----		6.68	59.00	20.68	3.89
Pisces (fishes) -----		2.59	1.26	1.07	
Miscellaneous and undetermined ¹ -----	2.15	1.20	.06	.29	.01
Total -----	89.46	83.22	84.83	87.89	85.98
Plant food:					
Najadaceae: <i>Ruppia maritima</i> (wigeongrass) -----			5.09		
Cyperaceae (sedges) -----		6.95			
Gentianaceae: <i>Menyanthes trifoliata</i> (bogbean) -----		1.40	1.40		
Miscellaneous and undetermined -----	10.54	8.43	8.68	12.11	14.02
Total -----	10.54	16.78	15.17	12.11	14.02
Gravel -----	19.26	13.38	13.99	19.61	10.73

¹ Any percentages for insects of a group not here listed are included under Miscellaneous and undetermined animal food.

Washington, D. C., and Denver, Colo. A systematic list of all foods found is presented in table 2, pages 22 to 34. As 103 stomachs were nearly empty or were collected in poorly represented months, in computing volumetric food and gravel percentages only 1,536 stomachs were used. Percentages for food are based on the total food content of the stomachs; for gravel, on the total stomach contents. The percentages, are given in table 1, with food groups listed systematically.

WOODCOCKS

AMERICAN WOODCOCK

The American woodcock (*Philohela minor*) (pl. 1), primarily a bird of the eastern United States, breeds from northeastern North Dakota, southern Manitoba, northern Michigan, southern Quebec, and Nova Scotia south to eastern Kansas, Louisiana, and rarely northern Florida; winters from central Arkansas, Kentucky, and North Carolina south to Texas and central Florida; and ranges occasionally to Montana, Saskatchewan, Keewatin, Newfoundland, and Bermuda.

Unlike most other shorebirds the woodcock, whether in low bottom, upland slope, or cornfield, seldom ventures far from wooded territory. It is not much affected by increased cultivation as long as a few brush-bordered streams or bits of marsh furnish nesting grounds. The scarcity of this much-sought game bird is due chiefly to excessive hunting in the past. Recent protective measures have done much toward remedying this fault, however, so that the bird is not now in immediate danger of extinction, and the recent survey made by Pettingill (1936)² indicates that it is holding its own.

MATERIAL EXAMINED

In all, 278 stomachs of American woodcocks were examined. As 17 of these were nearly empty or were taken in poorly represented months, only 261 were used in the computation of food percentages (table 1 and list below). These represent 10 months, March through December, and were taken from places well distributed throughout the bird's range, being from 16 States, the District of Columbia, and 3 Canadian Provinces.

Food, by volumetric percentages, of 261 American woodcocks taken during 10 months of the year

Animal food.....	89. 46
Earthworms.....	67. 81
Insects.....	18. 31
Diptera.....	6. 85
Coleoptera.....	6. 18
Lepidoptera.....	3. 29
Other insects.....	1. 99
Other animal food.....	3. 34
Plant food.....	10. 54

² Dates in parentheses refer to Literature Cited, p. 37.

ANIMAL FOOD—89.46 PERCENT

Practically nine-tenths of the food of the 261 woodcocks tabulated was derived from the animal kingdom, three-fourths of it from earthworms, one-fifth from insects, and the remainder from unimportant miscellaneous forms. The woodcock is especially fitted for obtaining earthworms and fly larvae, the two principal elements of its food, as its long, sensitive, probelike beak, having the upper mandible independently movable near the tip, is a veritable forceps, admirably suited for extracting particles of food from mud or soft earth.

EARTHWORMS—67.81 PERCENT

More than two-thirds of the total food was composed of earthworms (Lumbricidae), which were found in 223 of the 261 stomachs tabulated, 63 of which contained little or no other food. The lowest monthly average, 48.17, was for the 6 woodcocks collected in December, but the percentages for the 158 October, 9 April, and 23 July stomachs were 81.97, 77.78, and 76.26 respectively. Even in January, 1 of the 2 woodcocks taken had eaten enough earthworms to make 70 percent of its last meal. One bird with its stomach only half full had in its gullet an earthworm that was far digested at the lower end. This demonstrates the rapidity with which these soft annelids are digested, in view of which it is surprising that it has been possible to count as many as 12 of them in a single stomach.

These birds must indeed consume enormous quantities of earthworms, and the statement by Morris (1880) that his tame woodcock, weighing 6 ounces, "consumed 8 ounces of worms in 24 hours, and could have eaten more had I given them to him" seems not unreasonable.

INSECTS—18.31 PERCENT

Insects, which are here grouped and discussed in the order of their importance, furnished nearly one-fifth of the total food. The smallest monthly percentage was 3.38 in May, and the two next higher were 7 in April and 10.8 in October. In June, August, November, and December, however, the percentages were 21.63, 38.28, 19.24, and 33.34 respectively.

Diptera (6.85 percent).—Flies, usually maggots, averaged about two-fifths of the insect food. They were eaten in every month of the year, with maximum consumption, 14.6 percent, in March. Nearly all

EXPLANATION OF PLATE 1

American woodcock (*Philohela minor*).



common groups of flies whose larvae live in moist ground were represented. Those most often obtained were crane flies (Tipulidae), snipe flies (Rhagionidae), long-legged flies (Dolichopodidae), and horse-flies (Tabanidae).

Coleoptera (6.18 percent).—Beetles supplied a trifle more than a third of the insect food. Among them were beneficial and injurious species of ground beetles, both larvae and adults; click beetle larvae, or wire-worms, which are injurious to grain, strawberry, and other crops; adult rove beetles; lamellicorn beetle larvae, including those of leaf chafers (*Euphoria*), which in the adult form sometimes do much damage to roasting ears, peaches, grapes, and apples; soldier beetles (Cantharidae), snout beetles (Curculionidae); and predaceous diving beetles (Dytiscidae).

Lepidoptera (3.29 percent).—Caterpillars, including destructive cut-worms (Noctuidae), were sometimes eaten exclusively. They furnished slightly more than a sixth of the insect food and in June, August, and December averaged 8, 13.14, and 9.17 percent respectively.

Other insects (1.99 percent).—Ants (Formicidae) (0.54 percent), a frequent item in the diet, averaged 3.08 percent of the contents of the 25 November stomachs. The larvae of dobson flies and caddisflies, occasionally taken in quantity, were not regularly eaten and formed only a small fraction of the total food. Other insect items included stinkbugs (Pentatomidae), Mayfly eggs, a dragonfly nymph, grasshoppers, and crickets.

Aughey (1878, p. [51]), in conducting an extensive investigation of the bird enemies of the Rocky Mountain locust, found no fewer than 32 locusts, and a large number of other insects as well, in the stomach of a woodcock from Otoe County, Nebr.

OTHER ANIMAL FOOD—3.34 PERCENT

Crustaceans were eaten in only 5 of the 10 months for which tabulation of percentages was made, but they averaged 8 percent of the food in April. Myriapods (both millepedes and centipedes) were captured in 7 months and spiders in 6, sometimes in appreciable quantities, the single woodcock collected in February having eaten them to the extent of 35 percent of its last meal. In July, November, and December centipedes contributed 2.83, 2.12, and 3.33 percent of the food; and in August, October, and November spiders made up 2.86, 1.07, and 2.68 percent. Remains of salamanders (Mutilabilia), a frog (Ranidae), and a small land snail (Gastropoda) totaled 0.7 percent.

PLANT FOOD—10.54 PERCENT

Plant food, present in four-fifths of the 261 tabulated woodcock stomachs, constituted only a little more than one-tenth of the total diet and was not of great economic importance. Vegetable debris that manifestly could not have been taken for its own sake but was no doubt contained in the bodies of earthworms eaten was occasionally noted. Sometimes vegetable debris the source of which was not clear was found; but the varying quantities of plant fiber, bits of bark, leaves, and other plant matter, even though of adventitious origin, noticeably increased the plant food percentage.

A great variety of seeds were taken, most of them apparently voluntarily. The most important were seeds of sedges (chiefly *Carex*), violet (*Viola*), alder (*Alnus*), raspberries and blackberries (*Rubus*), cinquefoil (*Potentilla*), ragweed (*Ambrosia*), bedstraw (*Galium*), smartweeds (*Polygonum*), elder (*Sambucus*), panicums (*Panicum*), and pigeongrass (*Setaria*). In a single stomach 76 seeds of *S. viridis* formed 60 percent of the food content; and in another, 21 seeds of this species and 2 seeds of *S. lutescens*, furnished 92 percent.

Cottam (1934) records that some woodcocks in New Jersey ate cracked corn that a game warden had scattered on the ground for bobwhites.

A peculiar departure from the usual feeding habits of the species was observed by Webster (1887) in one of several woodcocks shot at Martha's Vineyard, Mass., in October 1885. Its crop was distended with "leaves of the common fern (*Pteris aquilina*), rolled up in so curious a manner, and in such quantity, as to plainly indicate that it was the result of a deliberate meal, and not an accident," although the bird was taken in a locality recorded as "an open marsh, with bushes here and there, while springs and small streams afforded in abundance the usual food."

EUROPEAN WOODCOCK

The European woodcock (*Scolopax rusticola*), an Old World species that according to MacIntyre (1928, p. 365) was still plentiful when he listed the record bag for the British Isles as 156 birds taken on Islay Island, January 21, 1926, has been collected occasionally in eastern North America from Newfoundland to Virginia. Its habits are similar to those of the American woodcock, and in all probability the food of those individuals that visit North America is no different from that of the American species. Even in its own range the chief items of food, as recorded by foreign writers, are the same as those that contribute the bulk of the subsistence of the American bird, namely, earthworms and insects and insect larvae. Seebohm (1885, p. 233) writes: "The chief food of the Woodcock consists of earth-

worms; but small beetles, grasshoppers, grass-seeds, and small vegetable fragments have been found in its stomach. It has also been known to swallow small shell-fish." Regarding shellfish in the diet Borrer (1891, p. 221) states: "I have taken from its stomach those of *Clausilia nigricans* whole, and the remains of those of *Aplexus hypnorum* comminuted." Other food items of record are an earwig (Newstead 1908, p. 81) and grains of maize (Witherby 1923, p. 684).

SNIPES

WILSON'S SNIPE

Wilson's snipe (*Capella delicata*) (pl. 2), or jacksnipe, as it is usually called, ranges over nearly all of North America and northern South America, breeding from northwestern Alaska and northern Ungava southward to northern California, Colorado, Iowa, and Pennsylvania. It winters from Washington, Wyoming, Oklahoma, and Virginia through Central America and the West Indies to southern Brazil, ranging occasionally northward to Alaska, Montana, North Dakota, Ontario, and Nova Scotia.

Formerly the jacksnipe was extremely abundant and in certain sections, especially the South, was slaughtered in great numbers by market hunters. The record of a single snipe hunter (Pringle 1899) in Louisiana, who shot not for the market but for his own table and those of his friends, shows how plentiful this bird was in the South and what unbelievable numbers could be killed by individual gunners. In the 20 years from 1867 to 1887 this hunter killed 69,087 jacksnipes, an average of nearly 3,500 a winter. In 1875 he averaged 150 for each day's hunt, and the record bag for 1 day (December 11, 1877) was 366. Fortunately the days of such slaughter are over, and the jacksnipe, in common with other shorebirds, has profited under spring protection. The popularity of the bird for sport is due partly to the excellence of its flesh but chiefly to the fact that its swift and irregular flight makes it an uncertain target and taxes the skill of the marksman.

MATERIAL EXAMINED

A total of 830 jacksnipe stomachs were examined, but the 14 collected in January, June, and July, being too few to represent fairly the food in these months, and 50 others, being nearly empty, were omitted from the calculations of food percentages (table 1 and list below), which are based, therefore, on the contents of 766 stomachs collected in the 9 months from February to December, exclusive of June and July. This material was obtained in 30 States, the District of Columbia, and 6 Canadian Provinces, 188 stomachs in Wisconsin,

167 in Maine, 93 in Florida, 70 in Massachusetts, 54 in Alabama, 45 in Illinois, and smaller numbers in the remaining localities.

*Food, by volumetric percentages, of 766 Wilson's snipes taken during
9 months of the year*

Animal food.....	83.22
Insects.....	49.30
Diptera.....	20.20
Coleoptera.....	15.87
Odonata.....	5.01
Hemiptera.....	3.03
Other insects.....	5.19
Crustaceans.....	11.70
Earthworms.....	11.30
Mollusks.....	6.68
Fishes.....	2.59
Other animal food.....	1.65
Plant food.....	16.78

ANIMAL FOOD—83.22 PERCENT

The animal food of the 766 jacksnipes comprised more than four-fifths of the total diet and was extremely varied. Insects, the most important group by far, furnished almost three-fifths of it; crustaceans and earthworms each about a seventh; and mollusks, fishes, and various miscellaneous items the remainder.

INSECTS—49.3 PERCENT

Insects of a variety of orders, discussed here in the order of their importance, contributed practically half the entire food, with monthly percentages as follows: February, 42.72; March, 51.26; April, 48.86; May, 41.5; August, 47.22; September, 52.33; October, 42.22; November, 51.09; and December, 66.18.

Diptera (20.2 percent).—Flies supplied a little more than two-fifths of the insect food. Those taken in appreciable quantities in every month of the year were chiefly species having aquatic larvae, and it was usually the larval forms that were eaten, occasionally in large numbers, 1 jacksnipe having captured 120 crane fly larvae (*Tipulidae*) and another, 250 larval midges. Other dipterons often consumed were soldier flies (*Stratiomyiidae*), horseflies (*Tabanidae*), and flower flies (*Syrphidae*). Housefly larvae (*Musca domestica*) had been picked up by a few and mosquito larvae (*Culicidae*) by 2 jacksnipes,

EXPLANATION OF PLATE 2

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Left, Wilson's snipe (*Capella delicata*); right, Eastern dowitcher (*Limnodromus griseus griseus*).



1 having taken 40 of these wrigglers and the other enough to make 66 percent of its meal.

Coleoptera (15.87 percent).—Beetles contributed almost a third of the insect food and were eaten regularly throughout the year. Nearly three-fourths of those taken were aquatic forms, a few crawling water beetles (Haliplidae) and 17 genera of predaceous diving beetles (Dytiscidae) having been identified. Of the latter many are destructive to other water-dwelling creatures, and some of the larger sorts are pests in fishponds. Another partly predaceous group, the water scavenger beetles (Hydrophilidae), was represented by adults and larvae of 12 genera. Among other beetles on the bill-of-fare were both beneficial and injurious species of ground beetles and some destructive species of leaf chafers (Scarabaeidae) and weevils (Curculionidae).

Odonata (5.01 percent).—On the wing, snake feeders, or devil's-darning-needles, as the dragonflies and damsel flies are popularly known, are so expert that they are practically safe from capture by shorebirds, but in the younger stages they live in the water, where they fall an easy prey to the jacksnipe and where the larger species destroy many young fishes. In this study, nymphal dragonflies comprised more than a tenth of the insect food and averaged 8.38 percent of the diet of the 64 jacksnipes collected in April.

Hemiptera (3.03 percent).—About a sixteenth of the insect food consisted of bugs, which during February and March averaged 7.79 percent of the food, or more than double the proportion they formed of the total diet. Creeping water bugs (Naucoridae), which feed principally on aquatic insects, and giant water bug nymphs (Belostomatidae), which are very destructive to young fishes, were most often captured. Water boatmen (Corixidae) also were often taken. Flower bugs (Anthocoridae), shore bugs (Saldidae), water striders (Veliidae), and back swimmers (Notonectidae) were found in single stomachs..

Other insects (5.19 percent).—Orthoptera, mainly crickets (Gryllidae), were captured throughout the year, in greatest quantity in December, when they averaged 7.89 percent of the food. During a severe local infestation of the Rocky Mountain locust in Nebraska, the number of locusts found in 11 jacksnipe stomachs examined by Aughey (1878, p. [51]) averaged 37.45. Wetmore (1916, p. 45) reported that mole cricket remains (*Scapteriscus didactylus*) comprised 10 percent of the food in the stomach of a jacksnipe from Puerto Rico. Dobson flies, usually larvae, were eaten by the jacksnipes examined in this study in each of the 9 well-represented months and in December furnished 4.57 percent of the food in the 35 stomachs. Caterpillars also were regularly taken. Mayfly nymphs were consumed in quantity only in October, when they composed 4.16 percent of the food in the 328

stomachs. As many as 72 were found in a single stomach. Caddisfly larvae were found in 63 stomachs. Ants (Formicidae) and a few other Hymenoptera were regularly eaten also but averaged a very small percentage of the total food.

CRUSTACEANS—11.7 PERCENT

Crustaceans, which furnished a trifle more than a ninth of the total food, were eaten in appreciable quantities in each of the 9 months. Among the considerable varieties taken were water fleas (*Daphnia*), beach fleas (Talitridae), crawfishes (*Cambarus*), and fiddler crabs (*Uca*). The greatest quantities were consumed in May, October, and September, when the percentages were 25.25, 19.85, and 19.4.

EARTHWORMS—11.3 PERCENT

Earthworms (Lumbricidae) supplied approximately a ninth of the total jacksnipe food and were found in 152 of the 766 stomachs tabulated. In many of these the earthworm remains consisted of only a few spicules, but in some they contributed as much as 50 to 75 percent of the meal and in a number 90 to 100 percent. The highest monthly percentage was 26.89, in August.

MOLLUSKS—6.68 PERCENT

Mollusks comprised only about one-fifteenth of the total jacksnipe food. Fresh-water snails were represented in greatest quantity, many stomachs containing as many as 25 each. Mollusks, chiefly small gastropods, contributed 13.89 percent of the food in the 107 stomachs collected in February.

FISHES—2.59 PERCENT

No fishes were eaten in April, August, or December, and only a few were taken in all other months except February, when the average was 20.33 percent. During that month, 63 jacksnipes were collected on St. Vincent Island, Fla., 49 of which had fed upon small fishes, making the average fish percentage for the group 34.52, or more than one-third of their entire food.

OTHER ANIMAL FOOD—1.65 PERCENT

Spiders (Araneae) were captured regularly throughout the year but in quantity only during September and October, when the percentages were 1.39 and 1.69. Several jacksnipes had made nearly half their last meal on them, 1 bird having devoured 19. Remains of beetle mites (Galumnidae) were found in 10 stomachs. Additional animal food items included clamworms (*Nereis*), 212 mandibles having been found in a single stomach; leeches (Hirudinea); salamanders (Muta-

bilia); tadpoles (*Ranidae*) and young frogs (*Rana*); and lizards (*Sauria*).

PLANT FOOD—16.78 PERCENT

The plant food of the jacksnipes examined, though extremely varied, may be classed in three main groups—sedge seeds, bogbean seeds, and miscellaneous plant food, chiefly seeds. Sedge seeds were most important as they furnished a trifle more than three-eighths of all the plant food. They were eaten in every month, averaging between 8 and 9 percent of the food during the last 4 months of the year, with bulrushes (*Scirpus*), common sedges (*Carex*), and sawgrass (*Mariscus*) supplying the most food. One jacksnipe had picked up 110 bulrush seeds. Bogbean seeds were next in value, averaging slightly more than a twelfth of the plant material consumed and in occasional stomachs comprising more than half the meal. They were taken only during the last 5 months of the year but in September and October formed 6.44 and 4.21 percent of the food. In the miscellaneous plant food, seeds of various smartweeds (*Polygonum*) were foremost, although those of grasses (*Gramineae*), chiefly wild millet (*Echinochloa*) and panicum (*Panicum*), were also well represented and those of the pondweeds (*Potamogeton*), arrowgrass (*Triglochin*), burreed (*Sparanium*), bedstraw (*Galium*), and ragweed (*Ambrosia*) were often eaten.

It is on record ("Princess Anne" 1896) that kernels of popcorn were found exuding from the craws of two jacksnipes killed in Virginia 15 miles below Virginia Beach.

GREAT SNIPE

The great, or double, snipe (*Capella media*) is an Old World species that has only one record for North America, in Canada. British authors report that the food of the species consists largely of earthworms and insect larvae, especially larvae of crane flies of the genus *Tipula*, and that small snails and slugs are also important. Among the minor food items they list beetles and caddis larvae (*Phryganeidae*).

AMERICAN KNOT

The American knot (*Calidris canutus rufus*) (Pl. 3) breeds from north Ellesmere Island east to northern Greenland and southwest to southern Victoria Island. It winters to Patagonia in South America and is casual in winter on the south Atlantic coast of the United States. During migration it occurs in numbers on the eastern coast of North America but is usually rare in the interior and on the Pacific coast. Sometimes it frequents muddy places, where it probes the ground for food; but more often it is seen on the beaches, where, playing back and forth on the sand, it nimbly gathers small forms of animal life uncovered by the receding waves.

Formerly these red-breasted snipes were extremely abundant during migration along the Atlantic coast and were shot in large numbers both in spring and fall. Their plump little bodies were in such demand for the table that every hunter seemed to kill as many as possible, and the readiness with which large and small flocks decoyed made them especially attractive to the market gunner. Were it not for the fact that for a number of years the species has been afforded complete protection, the knot would now be a very rare bird in North America.

MATERIAL EXAMINED

The number of American knot stomachs examined was 226, but the 2 collected in October, being too few to fairly represent the month, and 5 others, being nearly empty, were omitted in the computations of food percentages (table 1 and list below), which therefore are based on the contents of 219 stomachs collected in the 5 months May through September. The bulk of this material was obtained from Atlantic and Gulf Coast States from Maine to Louisiana and from the Province of Ontario, Canada. A very few stomachs were collected in the interior and in northern Greenland.

*Food, by volumetric percentages, of 219 American knots taken during
5 months of the year*

Animal food.....	84. 83
Mollusks.....	59. 00
Insects.....	14. 80
Diptera.....	12. 69
Coleoptera.....	1. 17
Other insects.....	. 94
Crustaceans.....	6. 86
King crab eggs.....	2. 02
Other animal food.....	2. 15
Plant food.....	15. 17

ANIMAL FOOD—84.83 PERCENT

Between eight- and nine-tenths of the food of the 219 knots consisted of animal matter, and of this nearly seven-tenths was composed of mollusks. Insects and crustaceans were the other important groups.

MOLLUSKS—59 PERCENT

Mollusks, which comprised nearly three-fifths of the total food, were found in all but 18 of the 226 stomachs examined. The lowest monthly average, 34 percent, was for the 14 knots collected in July;

EXPLANATION OF PLATE 3

American knot (*Colidris canutus rufus*).



W.B.M.

the highest, 95.7 percent, for the 106 May birds. Both univalves and bivalves were taken, the former more commonly and in far greater variety.

Among the univalves, the predaceous mud snails (*Nassariidae*) predominated, although several kinds of periwinkles (*Littorina*) and marine snails of the genus *Melampus* were well represented. As many as 46 fresh-water snails (*Valvata tricarinata*), 62 mud snails, and 89 periwinkles were recorded in 3 noteworthy stomachs.

Even though bivalves were less common than snails, a small marine pelecypod (*Donax*) was the principal item in many stomachs and counts of it in excess of 100 were frequent. One species (*D. variabilis*) furnished 98 percent of the food of 85 knots collected in Virginia in May; and a more southern form (*D. fossor*), 97 percent of the food of 10 knots taken along the coast of Florida, Alabama, and Louisiana in May, June, and July. It is undoubtedly to *Donax* that Wilson (1831, p. 66) refers as the "favorite food" of the knot and about which he states: "These usually lie at a short depth below the surface; but in some places are seen at low water in heaps, like masses of wet grain, in quantities of more than a bushel together." Other bivalves worthy of mention are the little gem shells (*Gemma gemma*), identified in 10 stomachs; the common blue mussel (*Mytilus edulis*), in 6; and the horse mussel (*Modiolus demissus*), in 2, in 1 of which 24 young ones were counted.

INSECTS—14.8 PERCENT

Diptera (12.69 percent).—Flies were the only important insect food. The monthly percentages were as follows: May, 1.37; June, 2.73; July, 47.64; August, 9.57; and September, 2.15, the high average for July being due to the fact that 8 of 11 knots collected in Massachusetts had fed almost exclusively on fly larvae. Soldier flies (*Stratiomyidae*) and brine flies (*Ephydriidae*) were eaten most often, 72 larvae of the former having been found in 1 stomach. Other dipterons taken include midges, horseflies (*Tabanidae*), dance flies (*Empididae*), and crane flies (*Tipulidae*).

Coleoptera (1.17 percent).—Beetles were eaten in each of the five well-represented months. Water scavenger beetles (*Hydrophilidae*) were most frequently captured, and ground beetles ranked second in importance.

Other insects (0.94 percent).—Among the miscellaneous insects that were only occasionally picked up and so formed an unimportant part of the food were ants (*Formicidae*) and bugs (*Hemiptera*), the latter including water boatmen, stinkbugs (*Pentatomidae*), and negro bugs (*Cydniidae*).

CRUSTACEANS—6.86 PERCENT

Crustaceans, usually represented by small forms well ground up with the remainder of the stomach contents, were eaten consistently in each of the five well-represented months, in greatest quantity in June, when they furnished 9.54 percent of the food. Small, unidentified ones composed almost nine-tenths of the meal of two birds collected in October.

KING CRAB EGGS—2.02 PERCENT

One knot collected in June had fed almost exclusively on spawn of the king crab, 110 whole eggs and fragments of many more having been found in its stomach.

OTHER ANIMAL FOOD—2.15 PERCENT

Fishes were taken only in September, when they contributed more than 6 percent of the food of the 67 knots collected. On the few occasions eaten, they were devoured in quantity. Marine worms, although recorded from 13 stomachs, were of little importance, as were spiders.

PLANT FOOD—15.17 PERCENT

Seeds of wigeongrass constituted about one-third of the plant material consumed. They were eaten by one-third of the knots collected late in summer and in fall and in 17 stomachs formed 78 percent of the contents. Seeds of bogbean and of goosefoot (*Chenopodium*) averaged more than 1 percent each, and seeds of eelgrass (*Zostera marina*), bayberry (*Myrica*), pondweed (*Potamogeton*), and bulrush (*Scirpus*) were frequently eaten. Record stomach counts of the more important seeds are as follows: Wigeongrass, 550, with fragments of many more; pigweed, 310; eelgrass, 90, with fragments of more; bogbean, 20; and bayberry, 14.

Ground-up rootstocks, which furnished 2.86 percent of the vegetable material, formed three-fourths of the food of four of the six Greenland knots taken in August. Plant debris amounted to 2.3 percent by bulk of the stomach contents. Manifestly not eaten for its own sake, it was negligible in well-represented months.

DOWITCHERS

Dowitchers are well distributed over practically the whole of North America and northern South America. Two subspecies are recognized, the eastern, or short-billed, dowitcher (*Limnodromus griseus griseus*) and the long-billed, or western, dowitcher (*L. g. scolopaceus*). Their known breeding grounds are about a thousand miles apart at the closest. Their winter ranges overlap somewhat,

however, and during migration either race may occasionally be found in the recognized territory of the other. Consequently, at certain seasons both forms are frequently shot from the same flock. For this reason some of the birds collected on the south Atlantic coast, particularly in Florida, may have been long-billed dowitchers, although not one of those whose stomachs were available for examination was identified as such.

In mixed flocks the chief food items of the two subspecies would no doubt be the same. In the material at hand there is little mixture of the two forms, however, as the eastern dowitchers, with one exception (Osler, Saskatchewan), were collected only as far west as Michigan and Alabama and no authentic stomachs of the long-billed dowitchers were taken east of South Dakota, Colorado, and Texas. Analyses of the stomach contents reveal that although animal material composed more than 85 percent of the food of each race, there are differences in the food habits of the two. Marine worms and mollusks were much more important in the food of the eastern dowitcher, with percentages of 27.37 and 20.88, respectively, than in that of the long-billed, with percentages of 3.24 and 3.89. On the other hand insects formed 70.97 percent of the food of the long-billed dowitcher but only 29.08 percent of that of the eastern. Such a marked difference in the main food items justifies separate treatment of the stomach contents of the two subspecies, even though the dissimilarity is probably directly due to differences in environment.

EASTERN DOWITCHER

The eastern, or short-billed, dowitcher (*Limnodromus griseus griseus*) (pl. 2), often called brownback, breeds from central Alberta to the west side of Hudson Bay, Churchill, and northward. It winters from Florida, probably rarely to North Carolina, and from the West Indies south to central Brazil and Peru. During migration it appears regularly on the Atlantic coast and occasionally in the eastern Mississippi Valley. Casual records include Greenland, Alaska, Idaho, Utah, Bermuda, Great Britain, France, and Siberia. The species often frequents fresh-water ponds and marshes near the coast but is more at home on tidal flats and sand bars, where most of its food is obtained.

Like most of the other larger shorebirds of the East, the eastern dowitcher was formerly abundant over considerable areas where now it is at most only locally common or occasionally abundant. Its rapid decrease in numbers is usually attributed to overshooting and to its habit, even when fired upon, of flying and sometimes alighting nearby in large compact flocks. Even after being raked with shot the survivors of a flock can often be called back until they are again

within range of the concealed gunner. This bird is now protected at all times by Federal law.

MATERIAL EXAMINED

A total of 198 eastern dowitcher stomachs were examined, but as 7 of these contained too little food for the percentages to be reliable, only 191, representing the 9 months from April to December, inclusive, were used in compiling the percentages that form the basis of this report (table 1 and list below). Two stomachs were collected in Michigan, 1 in Ontario, 8 (June) in eastern Saskatchewan, and all the others in Atlantic Coast States, most of them along the seashore, although a few (April) came from the neighborhood of fresh-water lakes.

*Food, by volumetric percentages, of 191 eastern dowitchers taken during
9 months of the year*

Animal food.....	87. 89
Insects.....	29. 08
Diptera.....	18. 00
Coleoptera.....	8. 92
Other insects.....	2. 16
Marine worms.....	27. 37
Mollusks.....	20. 88
Crustaceans.....	6. 14
King crab eggs.....	3. 27
Other animal food.....	1. 15
Plant food.....	12. 11

ANIMAL FOOD—87.89 PERCENT

The animal kingdom furnished nearly nine-tenths of the entire food of the 191 eastern dowitchers whose stomachs were tabulated. The chief groups were insects, marine worms, and mollusks, but crustaceans, king crab eggs, and various miscellaneous items also were taken.

INSECTS—29.08 PERCENT

Insects representing nine orders comprised almost three-tenths of the total food. They are here discussed in three groups: Diptera, Coleoptera, and other insects.

Diptera (18 percent).—Flies, chiefly larvae, were eaten in each of the 9 well-represented months except October, an exception that would doubtless be eliminated by the examination of additional stomachs collected in that month. The greatest monthly consumption was in July, when the percentage was 41.67, the next highest percentage being 31.04 in September. Midges, with a maximum percentage of 24.88 in September, ranked first. They were captured by 31 of the eastern dowitchers, all but 1 having obtained the larvae only. Several

birds devoured more than 300 larval midges each, the highest count from a single stomach being 500. Larvae of soldier flies (*Stratiomyidae*), eaten more often than larval midges but never in such large numbers, composed 29 percent of the contents of the 18 July stomachs. Larvae of dance flies (*Empididae*) and horseflies (*Tabanidae*) were regularly although less frequently taken, and larvae of brine flies (*Ephydriidae*), long-legged flies (*Dolichopodidae*), and crane flies (*Tipulidae*) and the curious rat-tailed maggots of a flower fly (*Eristalis*) were occasionally picked up.

Coleoptera (8.92 percent).—Beetles occupied second place on the list of insect foods. These hard-backed insects were not found in stomachs collected during October, November, and December but were frequent in those taken in at least 4 of the months from April through September. Eaten most extensively by birds from the interior, they furnished 30 percent of their food. Naturally, most of the species consumed were aquatic. Among these, water scavenger beetles (*Hydrophilidae*) and predaceous diving beetles (*Dytiscidae*) were most important, both adults and larvae having been captured. Other beetles were sometimes eaten in quantity, however, as evidenced by the 150 rove beetles that formed 80 percent of the stomach contents of a North Carolina eastern dowitcher. Weevils (*Curculionidae*), including species that normally feed on aquatic plants and the roots of grasses, were found in several stomachs.

Other insects (2.16 percent).—Of the other insects, dragonfly nymphs headed the list, being the only group that furnished more than 1 percent of the food. Water boatmen came next, with a little less than 1 percent. Less important were caddisfly larvae, small caterpillars, ants (*Formicidae*), and parasitic wasps (*Ichneumonidae*).

MARINE WORMS—27.37 PERCENT

Buried in the sand exposed by the tide are several kinds of clamworms (*Nereis*), enemies of clams, oysters, and other shellfishes, that seem to be the favorite objective for the probing bill of the eastern dowitcher. Together with occasional traces of other marine worms, they composed more than a fourth of the total food, a proportion greater than is known so far for any other bird and the more remarkable because 20 of the 21 birds collected in April and June were killed in localities remote from the seashore and had eaten no clamworms. They were found, however, sometimes in large numbers, in almost half the 198 stomachs examined and in 22 comprised from 90 to 100 percent of the contents. Jaws of no fewer than 800 were found in a single stomach, and counts of 300 to 500 were frequent.

MOLLUSKS—20.88 PERCENT

Mollusks also probably attract dowitchers to sand bars exposed by the falling tide. They contributed one-fifth of the total food of the 191 eastern dowitchers whose stomachs were tabulated and were eaten regularly throughout each of the 9 well-represented months, ranging from 4 percent in May to 41.33 percent in October. It is of interest to note that shellfishes averaged 20.97 and 37.38 percent, respectively, for August and September, the months when most of the stomachs were collected.

Both univalves and bivalves were picked up, but many more of the former, in accordance with their greater abundance. Marine snails were most heavily represented in the gastropod food—foremost among them being coffee-bean snails (*Melampus*), which are abundant in the grass of salt marshes near high-water line, and the predaceous mud snails (*Nassariidae*). The little gem shells (*Gemma gemma*) were the only bivalves identified that were frequently eaten. Among the other pelecypods were an oyster (*Ostrea virginica*), the common blue mussel (*Mytilus edulis*), and the hard-shelled clam (*Venus mercenaria*), each represented by fragments in a single stomach.

CRUSTACEANS—6.14 PERCENT

Crustaceans, including fiddler crabs (*Uca*), shrimps (*Crago*), fresh-water isopods (*Cyathura carinata*), and small, undetermined ostracods and amphipods, were next in importance to mollusks in the animal food of the 191 eastern dowitchers used in the tabulations, yet furnished a little less than one-sixteenth of the total subsistence. They were recorded for each well-represented month except April and in May and November averaged 26.29 and 12.39 percent, respectively.

KING CRAB EGGS—3.27 PERCENT

Spawn of the king, or horseshoe, crab was found in 7 stomachs, in all but 1 of which it formed more than three-fourths of the contents. The crab eggs and recently hatched young, at times as many as 300 in a single stomach, seemed to be available only during May, June, and July, when they contributed percentages of 6.14, 7.34, and 15.95, respectively.

OTHER ANIMAL FOOD—1.15 PERCENT

Fishes were captured in May, August, and November, but in quantity by only two eastern dowitchers that were collected in North Carolina in May and November and had fed almost exclusively upon small ones. Spiders and fragments of a hydroid were among the other items of animal food.

PLANT FOOD—12.11 PERCENT

The plant food of the eastern dowitchers examined was composed mainly of the seeds of marsh and aquatic plants, although some vegetable debris (3 percent) was found, probably not intentionally taken but more likely picked up incidentally with seeds and fly larvae. Seeds of sedges, chiefly bulrushes (*Scirpus*), ranked first, with those of bayberry (*Myrica*) a close second. Pondweeds (*Potamogeton*) and wigeongrass (*Ruppia maritima*) were each recorded from 32 stomachs, and bogbean from 18. Occasionally bogbean seeds were the only food present, as many as 19 having been found in a single stomach. The variety of seeds that may be eaten by one individual is shown in the following list of seeds that comprised 95 percent of the contents of a single stomach: 1 burreed (*Sparganium*), 1 pondweed, 7 wigeongrass, 16 bulrush, 2 maretail (*Hippuris*), 1 water-milfoil (*Myriophyllum*), and 3 bogbean.

LONG-BILLED DOWITCHER

The long-billed dowitcher (*Limnodromus griseus scolopaceus*) breeds from Point Barrow and the mouth of the Yukon east to northwestern Mackenzie and migrates southeastward mainly through the western Mississippi Valley. During late fall and in winter it occurs also in Louisiana, Florida, and California south probably to South America. This subspecies occasionally visits the Atlantic coast from Maine southward to the West Indies and straggles westward to Japan and the northern coast of eastern Siberia.

In their migrations over the United States the long-billed dowitchers are far more numerous around inland lakes and marshes than along the coast. Dr. Alexander Wetmore found them in large flocks at the Bear River marshes, Utah, in the fall of 1915. His field notes made at that time state:

These birds were found usually on soft mud bars where the water was 1 to 2 inches deep. They stood about in flocks frequently sinking in the mud nearly to their bodies. In feeding they were slow and deliberate, probing in the mud with their long bills, often immersing the head entirely in the water. They moved slowly and covered the ground carefully. In fall dowitchers often came about the duck blinds and probed the lumps of mud thrown up to serve as decoys by the hunters. At such times they were often very tame and were not frightened by repeated shooting.

MATERIAL EXAMINED

One-third of the 107 stomachs of the long-billed dowitchers examined were taken in Utah and the others in well-distributed localities from Alaska south to southern California and east to South Dakota, Colorado, and Texas. The 99 stomachs that were used for the estimation of food percentages (table 1 and list below) represent the 7 months from April to October, inclusive.

Food, by volumetric percentages, of 99 long-billed dowitchers taken during 7 months of the year

Animal food.....	85.98
Insects.....	70.97
Diptera.....	58.33
Coleoptera.....	10.63
Other insects.....	2.01
Crustaceans.....	7.72
Mollusks.....	3.89
Marine worms.....	3.24
Other animal food.....	.16
Plant food.....	14.02

ANIMAL FOOD—85.98 PERCENT

The animal food of the 99 long-billed dowitchers, although comprising approximately nine-tenths of the total diet, was even less varied than that of its eastern relative. Insects were by far the most important, but crustaceans, mollusks, marine worms, and miscellaneous items also were taken.

INSECTS—70.97 PERCENT

Insects furnished more than seven-tenths of the total subsistence and more than four-fifths of the animal food of the long-billed dowitchers. The forms taken include a host of flies, several kinds of beetles, some bugs, dragonfly nymphs, and miscellaneous forms.

Diptera (58.33 percent).—Flies, chiefly larval forms, averaged nearly three-fifths of the entire food—a proportion more than three times as great as for the eastern dowitchers—and supplied four-fifths of the insect food. The highest percentage they furnished of the monthly food was in September, 72.96 percent; the lowest, in June, but even then they averaged 47.25 percent, or more than half the animal food. Most of the flies consumed were midges. These were found in two-thirds of the 107 stomachs examined, with monthly percentages ranging from 9.82 in May to 72.05 in September, and furnished nearly half the animal food. Adults were captured occasionally, but larvae mainly, and counts of from 200 to 300 in a stomach were common. Other fly larvae were important in May, June, and August, when they comprised 40.59, 47.25, and 26.5 percent of the food respectively. Crane flies (Tipulidae) were strongly represented in stomachs from Alaska, in which they averaged 30 percent of the food and in which soldier flies (Stratiomyiidae) averaged 20 percent and dance flies (Empididae) and snipe flies (Rhagionidae) 6 percent each. Horseflies (Tabanidae), brine flies (Ephydriidae), and flower flies (Syrphidae) were eaten in lesser quantities.

Coleoptera (10.63 percent).—The beetles eaten by the long-billed dowitcher are very similar in kind and quantity to those found in the

stomachs of its eastern relative. Water beetles (Hydrophilidae and Dytiscidae), ranging from less than 1 percent in April and October to 21.5 percent in July, were represented in each month. Other coleopterons, including ground beetles, rove beetles, and weevils (Curculionidae), were sparingly eaten by a small number of birds.

Other insects (2.01 percent).—Although water boatmen averaged less than 1 percent of the food for the 7 months, they contributed 2.4 and 2.88 percent in August and October respectively. Dragonfly larvae were eaten in only 4 of the 7 months but comprised 5.37 percent of the contents of the 27 stomachs collected in May. Caddisfly larvae, a back swimmer (Notonectidae), parasitic wasps (Ichneumonidae), ants (Formicidae), a Mayfly larva, and a caterpillar complete the list of insects eaten.

CRUSTACEANS—7.72 PERCENT

Crustaceans, found in 10 of the 99 long-billed dowitcher stomachs, were eaten in 4 months, averaging less than 3 percent in May and September and a mere trace in October. The higher average for the 7 months is due to the fact that 2 of the 4 April birds had fed almost entirely on crustaceans. It probably would be considerably lowered if a larger number of stomachs collected in April were available for examination.

MOLLUSKS—3.89 PERCENT

Mollusks were found in 31 of the 99 stomachs. They were consumed in each of the 7 months except June, in greatest quantities (16.1 percent) in August. Many species were identified, but no particular one seemed to be preferred.

MARINE WORMS—3.24 PERCENT

Marine worms, so important in the diet of the eastern dowitcher, were found in but nine stomachs of the western bird.

OTHER ANIMAL FOOD—0.16 PERCENT

Spiders were eaten in 4 of the 7 months and formed 1.15 percent of the contents of the 27 stomachs collected in May, but the average for the year was negligible. Fish remains were found in 1 stomach.

PLANT FOOD—14.02 PERCENT

Four-fifths of the long-billed dowitcher stomachs examined contained some plant food. This was composed for the most part of seeds of a great variety of aquatic plants, the most important of which were bulrushes (*Scirpus*) and pondweeds (*Potamogeton*). Others that were of more than casual occurrence are wigeongrass (*Ruppia maritima*), marestail (*Hippuris vulgaris*), smartweeds (*Polygonum*), grasses

(Gramineae), sedges (Cyperaceae) other than bulrush, cloudberry (*Rubus chamaemorus*), bogbean (*Menyanthes trifoliata*), and cleavers (*Galium*). Fragments of seeds of the cocklebur (*Xanthium*), seldom recorded in the diet of birds, were found in two stomachs.

A considerable part of the plant food, however, was composed of fibers and other vegetable debris that probably was not intentionally eaten. A single stomach collected in January, which was less than one-fourth full, contained a mere trace of animal food (an ant) but several seeds and a quantity of vegetable debris.

SYSTEMATIC LIST OF FOODS

Table 2 gives a list, arranged in systematic order, of every food found in the 1,639 stomachs of the 5 North American shorebirds examined and records the number of stomachs in which each occurred.

TABLE 2.—*Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found*¹

ANIMAL FOOD					
Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long- billed dowitcher
Stomachs u ed	Number 278	Number 830	Number 226	Number 198	Number 107
COELENTERATA					
Hydrozoa (hydroids)				1	
BRYOZOA					
Plumatellidae		4			
ANNELIDA					
Polychaeta (Chaetopoda):					
Nereidae:					
<i>Nereis</i> sp. (clamworms)		14	13	86	6
Undetermined				8	3
Oligochaeta:					
Lumbricidae (earthworms):					
<i>Lumbricus</i> sp.	1				
Undetermined	251	152			
Hirudinea (leeches):					
Herpobdellidae:					
<i>Herpobdella punctata</i>		1			
Undetermined		1			
CRUSTACEA					
Branchiopoda:					
Daphniidae (water fleas):					
<i>Daphnia</i> sp.				1	2
Undetermined		3			2
Copepoda		1			
Ostracoda		2		7	

¹ Arrangement systematic through families; alphabetic for genera and species. Arrangement and nomenclature according to the following:

Invertebrata (except Insecta and Mollusca): PRATT, H. S., A Manual of the Common Invertebrate Animals, Exclusive of Insects. Philadelphia, 1935.

Insecta: LEONARD, M. D., A List of the Insects of New York, with a List of the Spiders and Certain Other Allied Groups. N. Y. (Cornell) Agr. Expt. Sta. Mem. 101. Ithaca, N. Y., 1926. Common names largely from COMSTOCK, J. H., An Introduction to Entomology. 8th ed. rev. Ithaca, N. Y., 1936.

Mollusca: Checked by Dr. HARALD A. REHDER, assistant curator, Division of Mollusks, U. S. National Museum.

Plants: Checked by NEIL HORCHKEISS, associate biologist, Section of Food Habits, Bureau of Biological Survey, with arrangement according to Engler and Prantl system and nomenclature according to International Rules of Botanical Nomenclature.

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

ANIMAL FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long-billed dowitcher
CRUSTACEA—continued					
Amphipoda:					
Talitridae (beach fleas):	Number	Number	Number	Number	Number
<i>Orchestia grillus</i>		4			
<i>traskiana</i>		1			
Undetermined.....		19	1		
Gammaridae:					
<i>Echinogammarus ochotensis</i>					1
Corophiidae:					
<i>Corophium spinicorne</i>					1
Undetermined.....		97	5	3	3
Isopoda:					
Anthuridae:					
<i>Cyathura carinata</i>				8	
Sphaeromidae:					
<i>Ezophaeroma oregonensis</i>					3
Idotheidae:					
<i>Idothea</i> sp.....			2		
Asellidae:					
<i>Asellus communis</i>		27			
Undetermined.....		1			
Oniscidae (sow bugs).....	1				
Undetermined.....	2	19	1		2
Decapoda (shrimps, crawfishes, lobsters, crabs):					
Crangonidae (shrimps):					
<i>Crango</i> sp.....				4	
Astacidae (crawfishes):					
<i>Cambarus</i> sp.....		10	1		
Brachyura (crabs):					
Ocypodidae (sand and fiddler crabs):					
<i>Uca minax</i>				1	
<i>pugillator</i>		3			
<i>pugnax</i>		1		1	
sp. undetermined.....				2	
Undetermined.....				11	
Undetermined.....		9	10		
Undetermined Crustacea.....	2	54	17	9	
XIPHOSURA					
<i>Limulus polyphemus</i> (king, or horseshoe, crab), eggs and young.....			4	7	
ARACHNIDA					
Araneae (spiders):					
Lycosidae (wolf spiders).....	4	24		1	2
Linyphiidae (small spiders).....					1
Argiopidae (orb-web spiders):					
<i>Araneus</i> sp.....		1			
<i>Tetragnatha</i> sp.....		1			
Attidae (jumping spiders).....		2			
Undetermined.....	64	137	3	4	10
Acarina (mites):					
Galumnidae (horny or beetle mites).....		10			
DIPLOPODA					
Julidae (millepedes).....	1				
Polydesmidae (millepedes).....	1				
CHILOPODA					
Geophilidae (centipedes):					
<i>Arenophilus bipuncticeps</i>	1				
Undetermined.....	10	1			
Lithobiidae (centipedes).....	3				
Undetermined Chilopoda.....	7	1			
INSECTA					
Orthoptera (grasshoppers, crickets, cockroaches, etc.):					
Tettigoniidae (Locustidae) (long-horned grasshoppers).....	1	6			
Gryllidae (crickets):					
<i>Nemobius</i> sp.....		112	2	1	
Undetermined.....	1	16	2		
Acrididae (short-horned grasshoppers).....	2	2	1		
Undetermined adults and eggs.....	2	11		1	

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

ANIMAL FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long- billed dowitcher
INSECTA—continued					
Neuroptera (lacewing flies, ant lions, etc.):					
Sialidae:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
<i>Chauliodes</i> sp. (dobson fly), larvae	1	3			
<i>Corydalus</i> sp. (dobson fly), larvae	2	39			
Undetermined larvae	1	28			
Undetermined larva	1				
Ephemeroptera (mayflies), nymphs	1	26			1
Odonata (dragonflies and damselflies):					
Anisoptera (dragonflies):					
Aeschnidae:					
<i>Anax junius</i>		1			
Undetermined nymphs		2			
Libellulidae:		17			1
Undetermined:					
Adults			2		
Nymphs		3			1
Undetermined nymphs	1	128		9	5
Plecoptera (stone flies), larva		1			
Mallophaga (bird lice):					
Menoponidae:					
<i>Colpocephalum</i> sp.				1	
Philopteridae:					
<i>Degeeriella</i> sp.			1		
Hemiptera (true bugs):					
Cydnidae (burrower bugs and negro bugs):					
<i>Galgupha</i> sp.			1		
Undetermined			2		
Pentatomidae (stinkbugs):					
<i>Apatecticus</i> sp.			1		
<i>Banasa dimidiata</i>			1		
<i>Elasmostethus cruciatus</i>			1		
<i>Menecles insertus</i>			1		
<i>Zicrona caerulea</i>			1		
Undetermined	3		1		
Mesoveliidae:					
<i>Mesovelia mulsanti</i>		1			
Anthocoridae (flower bugs)		1			
Veliidae (water striders)		1			
Saldidae (shore bugs):					
<i>Pentacora ligata</i>				4	
<i>Salda</i> sp.		1			
Notonectidae (back swimmers):					
<i>Plea striola</i>		1			
Undetermined					1
Naucoridae (creeping water bugs):					
<i>Pelocoris femoratus</i>		30			
Undetermined		8			
Belostomatidae (giant water bugs):					
<i>Belostoma</i> sp.		7			
Undetermined		6			
Corixidae (water boatmen):					
<i>Corixa</i> sp.		2			1
Undetermined		23	3	21	12
Undetermined	1	2	2		
Homoptera (cicadas, leafhoppers, aphids, etc.):					
Cercopidae (spittle insects, frog hoppers):					
<i>Aphrophora parallela</i>	1				
Membracidae (treehoppers)			1		
Cicadellidae (leafhoppers)		2			
Fulgoridae (lantern flies)		1			
Undetermined	1				
Coleoptera (beetles):					
Cicindelidae (tiger beetles):					
<i>Cicindela</i> sp.		1			
Undetermined		1			
Carabidae (ground beetles):					
<i>Agonoderus</i> sp.	3		1		
<i>Anara</i> sp.	5	2	2		4
<i>Anadapty baltimorensis</i>		1			
<i>Anisodactylus agricola</i>	1				
sp. undetermined		1			
<i>Bembidion variegatum</i>	1				
sp. undetermined	2	3			1
<i>Chlaenius</i> sp.	1				
<i>Clivina</i> sp.	2				

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

ANIMAL FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long-billed dowitcher
INSECTA—continued					
Coleoptera (beetles)—Continued.					
Carabidae (ground beetles)—Continued.	Number	Number	Number	Number	Number
<i>Cryobius</i> sp.	-----	-----	-----	-----	1
<i>Elaphrus</i> sp.	-----	1	-----	-----	-----
<i>Harpalus</i> sp.	-----	4	-----	-----	-----
<i>Micromaseus patruelis</i>	-----	5	-----	-----	-----
sp. undetermined.	1	-----	-----	-----	-----
<i>Oodes</i> sp.	-----	1	-----	-----	-----
<i>Patrobus longicornis</i>	1	-----	-----	-----	-----
<i>Platynus cupripennis</i>	-----	-----	1	-----	-----
<i>variolatus</i>	1	-----	-----	-----	-----
sp. undetermined.	-----	2	-----	-----	1
<i>Poecilus lucublandus</i>	1	2	-----	-----	-----
<i>Pseudargutor erythropus</i>	-----	3	-----	-----	-----
<i>Pterostichus</i> sp.	3	2	-----	-----	2
<i>Stenolophus ochropeus</i>	1	-----	-----	-----	-----
sp. undetermined.	1	1	-----	-----	-----
<i>Trechus</i> sp.	1	-----	-----	-----	-----
<i>Trilathrus badipennis</i>	2	-----	-----	-----	-----
Undetermined:					
Adults.	60	128	3	1	7
Larvae.	24	16	2	-----	1
Halipilidae (crawling water beetles):					
<i>Haliptus ruficollis</i>	-----	-----	-----	-----	1
<i>triopsis</i>	-----	1	-----	-----	-----
sp. undetermined.	-----	3	-----	-----	-----
<i>Peltodytes</i> sp.	-----	5	-----	-----	-----
Dytiscidae (predaceous diving beetles):					
<i>Acilius</i> sp.	-----	1	-----	-----	-----
<i>Agabus punctatus</i>	-----	2	-----	-----	-----
sp. undetermined.	-----	4	-----	-----	-----
<i>Canthyrus bicolor</i>	-----	1	-----	-----	-----
<i>Coelambus punctatus</i>	-----	1	-----	-----	-----
<i>unguicularis</i>	-----	-----	-----	-----	1
sp. undetermined.	-----	17	-----	1	5
<i>Colymbetes sculptilis</i>	-----	9	-----	-----	-----
<i>Copelatus chevrolati</i>	-----	1	-----	-----	-----
<i>glyphicus</i>	-----	2	-----	-----	-----
sp. undetermined.	-----	1	-----	-----	-----
<i>Coptotomus interrogatus</i>	-----	3	-----	-----	-----
sp. undetermined.	-----	7	-----	1	-----
<i>Dytiscus</i> sp.	-----	3	-----	-----	-----
<i>Graphoderes</i> sp.	-----	2	-----	-----	-----
<i>Hydaticus</i> sp.	-----	1	-----	-----	-----
<i>Hydrocanthus iricolor</i>	-----	2	-----	-----	-----
sp. undetermined.	-----	2	-----	-----	-----
<i>Hydroporus subvirescens</i>	-----	-----	-----	-----	1
sp. undetermined.	-----	13	-----	-----	-----
<i>Ilybius</i> sp.	-----	1	-----	-----	-----
<i>Laccophilus</i> sp.	-----	2	-----	-----	-----
<i>Matus bicarinatus</i>	-----	1	-----	-----	-----
<i>Rhantus</i> sp.	-----	5	-----	-----	-----
<i>Thermonectes basilaris</i>	-----	9	-----	-----	-----
sp. undetermined.	-----	12	-----	1	1
Undetermined:					
Adults.	-----	117	-----	3	11
Larvae.	2	65	-----	9	5
Hydrophilidae (water scavenger beetles):					
<i>Berosus infuscatus</i>	-----	1	-----	-----	-----
<i>striatus</i>	-----	2	-----	-----	-----
sp. undetermined.	-----	28	-----	9	9
<i>Cercyon</i> sp.	-----	1	-----	-----	-----
<i>Cymbiodyta</i> sp.	-----	1	-----	-----	-----
<i>Deralius altus</i>	-----	1	-----	-----	-----
<i>Enochrus cinctus</i>	-----	3	-----	-----	-----
<i>consors</i>	-----	1	-----	-----	-----
<i>hamiltoni</i>	-----	1	-----	-----	-----
<i>ochraceus</i>	-----	1	-----	-----	-----
sp. undetermined.	-----	50	15	37	6
<i>Helochaers</i> sp.	-----	1	-----	-----	-----
<i>Helophorus</i> sp.	-----	5	-----	6	6
<i>Hydrobius fuscipes</i>	-----	25	-----	2	-----
sp. undetermined.	-----	5	-----	-----	1
<i>Hydrophilus obtusatus</i>	-----	1	-----	-----	-----
<i>Laccobius agilis</i>	-----	2	-----	-----	-----

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

ANIMAL FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long-billed dowitcher
INSECTA—continued					
Coleoptera (beetles)—Continued.					
Hydrophilidae (water scavenger beetles)—Con.	Number	Number	Number	Number	Number
<i>Ochthebius</i> sp.	-----	1	-----	-----	-----
<i>Tropisternus glaber</i>	-----	1	-----	-----	-----
<i>striolatus</i>	-----	35	-----	-----	-----
sp. undetermined.....	-----	38	-----	10	2
Undetermined:	-----	-----	-----	-----	-----
Adults.....	-----	-----	-----	-----	-----
Larvae.....	1	93	-----	8	6
Staphylinidae (rove beetles):	-----	39	-----	6	2
<i>Bledius</i> sp.	-----	-----	-----	1	-----
<i>Cafius canescens</i>	-----	-----	1	-----	-----
<i>Cryptobium</i> sp.	4	-----	-----	-----	-----
<i>Gyrophypnus emmersus</i>	1	-----	-----	-----	-----
sp. undetermined.....	1	-----	-----	-----	-----
<i>Lathrobium</i> sp.	2	-----	-----	-----	-----
<i>Omalius</i> sp.	1	-----	-----	-----	-----
<i>Philonthus</i> sp.	2	4	-----	-----	4
<i>Quedius</i> sp.	1	-----	-----	-----	-----
<i>Staphylinus</i> sp.	1	-----	-----	-----	-----
<i>Stilicus</i> sp.	-----	1	-----	-----	-----
Undetermined:	-----	-----	-----	-----	-----
Adults.....	32	14	1	6	2
Larvae.....	-----	1	-----	-----	-----
Histeridae (shining carrion beetles):	-----	-----	1	-----	-----
<i>Hister</i> sp.	-----	-----	-----	-----	-----
Cantharidae (soldier beetles):	-----	-----	-----	-----	-----
<i>Cantharis</i> sp.	2	-----	-----	-----	-----
Undetermined larvae.....	5	5	-----	-----	-----
Elateridae (click beetles):	-----	-----	-----	-----	-----
<i>Agriotes</i> sp.	2	-----	-----	-----	-----
<i>Athous</i> sp.	1	1	-----	-----	-----
<i>Dolopius marginatus</i>	1	-----	-----	-----	-----
<i>Limonius</i> sp.	1	-----	-----	-----	-----
<i>Orthostethus</i> sp.	1	-----	-----	-----	-----
Undetermined:	-----	-----	-----	-----	-----
Adults.....	5	3	3	-----	-----
Larvae.....	25	6	-----	-----	-----
Helmidae:	-----	-----	-----	-----	-----
<i>Heterelmis latiusculus</i>	1	-----	-----	-----	-----
<i>Stenelmis</i> sp.	-----	1	-----	-----	-----
Heteroceridae (mud beetles):	-----	-----	-----	-----	-----
<i>Heterocerus</i> sp.	1	10	3	4	2
Helodidae:	-----	-----	-----	-----	-----
<i>Ptilodactyla</i> sp.	1	-----	-----	-----	-----
Byrrhidae (pill beetles):	-----	-----	-----	-----	-----
<i>Cytilus alternatus</i>	-----	1	1	-----	-----
Nitidulidae (sap-feeding beetles):	-----	-----	-----	-----	-----
<i>Glischrochilus fasciatus</i>	-----	-----	1	-----	-----
Coccinellidae (ladybugs):	-----	-----	-----	-----	-----
<i>Ceratomegilla fuscilabris</i>	-----	1	-----	-----	-----
Alleculidae (comb-clawed bark beetles):	-----	-----	-----	-----	-----
<i>Capnochroa fuliginosa</i>	1	-----	-----	-----	-----
Undetermined larvae.....	1	-----	-----	-----	-----
Tenebrionidae (darkling beetles):	-----	-----	-----	-----	-----
<i>Anaedes brunneus</i>	2	-----	-----	-----	-----
<i>Eleodes obsoleta</i>	-----	1	-----	-----	-----
Undetermined:	-----	-----	-----	-----	-----
Adults.....	3	1	1	-----	-----
Larvae.....	5	-----	-----	-----	-----
Scarabaeidae (lamellicorn beetles):	-----	-----	-----	-----	-----
<i>Aphodius distinctus</i>	-----	2	-----	-----	-----
<i>fimetarius</i>	-----	7	-----	-----	-----
<i>granarius</i>	-----	1	-----	-----	-----
sp. undetermined.....	-----	2	-----	-----	1
<i>Cotinis</i> sp.	1	-----	-----	-----	-----
<i>Dyscinetus trachypygus</i>	-----	2	-----	-----	-----
<i>Euphoria</i> sp., larvae.....	7	1	-----	-----	-----
<i>Phyllophaga</i> sp.	-----	1	-----	-----	-----
Undetermined:	-----	-----	-----	-----	-----
Adults.....	4	10	4	1	-----
Larvae.....	5	7	-----	-----	-----
Lucanidae (stag beetles):	-----	-----	-----	-----	-----
<i>Platycerus</i> sp.	-----	-----	1	-----	-----
Cerambycidae (long-horned beetles).....	-----	1	-----	-----	-----

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

ANIMAL FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long- billed dowitcher
INSECTA—continued					
Coleoptera (beetles)—Continued.					
Chrysomelidae (leaf beetles):	Number	Number	Number	Number	Number
<i>Calligrapha elegans</i>		1			
<i>Chrysomela subsulcata</i>					1
<i>Colaspis favosa</i>			1		
<i>Donacia</i> sp.		3			
<i>Haltica bimarginata</i>			1		
sp. undetermined			1		
<i>Lema</i> sp.		1			
<i>Oedionychis limbatis</i>	1	1			
<i>Orsodacne atra</i>			1		
<i>Rhabdopterus picipes</i>	1				
Undetermined			3		3
Rhynchophora (weevils):					
Curculionidae (snout beetles):					
<i>Brachyrhinus opatus</i>					1
<i>Elassoptes marinus</i>			1		
<i>Hypera punctata</i>		2			
<i>Hyperodes humilis</i>		3			
sp. undetermined	1	2			1
<i>Listronotus</i> sp.		2		1	1
<i>Lixus</i> sp.		3			
<i>Smicronyx</i> sp.	1				
<i>Sphenophorus costipennis</i>		1			
<i>savi</i>		1			
sp. undetermined		4			
<i>Tyloderma foveolata</i>			3	4	
Undetermined	3	4	2		
Scolytidae (engraver beetles)	1				
Undetermined	1	16		1	
Undetermined:					
Adults	14	116	3	8	3
Larvae	10	5		1	1
Trichoptera (caddisflies), larvae	5	63	1	2	2
Lepidoptera (butterflies, moths):					
Noctuidae (cutworms)	1	1			
Undetermined:					
Adults	7				
Caterpillars	20	40		2	1
Cocoons	6	1			
Diptera (flies):					
Tipulidae (crane flies):					
<i>Tipula</i> sp.	13	52			10
Undetermined:					
Adults		8	1		
Eggs	1				2
Larvae	64	140		1	5
Pupae					1
Culicidae (mosquitoes)		2			
Chironomidae (midges):					
<i>Ceratopogon</i> sp.		1			
<i>Chironomus lobiferus</i>					2
<i>tentans</i>		1			
sp. undetermined		4	2		2
<i>Palpomyia</i> sp.		1			
Undetermined:					
Adults	1		2	1	13
Larvae		64	4	30	63
Pupae					3
Sciariidae (fungus gnats):					
<i>Sciara</i> sp.	1				
Xylophaginae, larvae	1				
Stratiomyiidae (soldier flies):					
<i>Odontomyia cincta</i>		18	1	6	3
<i>vertebrata</i>				6	
sp. undetermined		11	4	8	1
<i>Stratiomyia norma</i>		16			
sp. undetermined		15			
Undetermined:					
Adults		4			
Larvae	2	88	6	15	9
Tabanidae (horseflies):					
<i>Chrysops</i> sp.		5		3	2
<i>Tabanus atratus</i>		4		1	
sp. undetermined	2	22		2	1

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

ANIMAL FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long-billed dowitcher
INSECTA—continued					
Diptera (flies)—Continued.					
Tabanidae (horseflies)—Continued.					
Undetermined:	Number	Number	Number	Number	Number
Adults.....		2			
Larvae.....	6	58	3	6	4
Rhagionidae (snipe flies), larvae.....	34	9			2
Therevidae (stiletto flies), larvae.....	3				
Asilidae (robber flies):					
<i>Promachus</i> sp.....	1				
Undetermined adults.....					1
Dolichopodidae (long-legged flies).....	5	11		3	
Empididae (dance flies), larvae.....		1	2	17	4
Syrphidae (flower flies):					
<i>Eristalis tenax</i>		1			
sp. undetermined, larvae.....		11		5	4
Sarcophagidae (sarcophagid flies):					
Adults.....		1			
Larvae.....	2		1		2
Muscidae (houseflies):					
<i>Musca domestica</i>		2			
Larvae.....		3			
Anthomyiidae.....		2			
Ortaliidae.....		2			
Ephydriidae (brine flies):					
Adults.....			1		
Larvae.....			8	4	2
Pupae.....			2		
Undetermined:					
Adults.....		1	5	1	
Larvae.....	13	39	4	7	3
Pupae.....			6	1	
Hymenoptera (bees, wasps, ants, etc.):					
Tenthredinidae (sawflies).....	2				
Alysiinae.....		1			
Ichneumonidae (ichneumon flies):					
<i>Amblyteles</i> sp.....		1			
<i>Hoplectis conquisitor</i>		1			
<i>Phaogenes</i> sp.....			1		
Plectiscini.....		1			
<i>Plesignathus</i> sp.....					1
Proctotrupidae or Serphidae:					
<i>Proctotrupes</i> sp.....		1			
Ceraphronidae.....		1			
Chalcididae (chalcid flies):					
<i>Spilochalcis</i> sp.....				8	
Formicidae (ants):					
<i>Aphaenogaster fulva</i>	2				
<i>Camponotus herculeanus pennsylvanicus</i>			1		
sp. undetermined.....	1	1	1		
<i>Crematogaster lineolata</i>		1	1		
<i>Formica</i> sp.....	4				
<i>Lasius niger</i>			2		
sp. undetermined.....	4	1			
<i>Myrmica scabrinodis</i>		10	1		
sp. undetermined.....	7	5			
<i>Ponera</i> sp.....		2			
<i>Solenopsis</i> sp.....		1			1
Undetermined.....	21	25	1	1	2
Undetermined:					
Adults.....	14		5	1	1
Cocoons.....		4			
Undetermined Insecta:					
Adults.....	4	6			2
Egg cases.....		2			
Insect galls.....	2	7			
Larvae.....	1	6			
Pupae.....	2				
MOLLUSCA					
Gastropoda (univalves):					
Neritidae:					
<i>Neritina reclinata</i>				1	
Valvatidae:					
<i>Valvata tricarinata</i>			1	1	

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

ANIMAL FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long-billed dowitcher
MOLLUSCA—continued					
Gastropoda (univalves)—Continued.					
Hydrobiidae:	Number	Number	Number	Number	Number
<i>Amnicola limosa</i>		1			1
<i>lustrica</i>			1		
sp. undetermined.....			2	3	1
<i>Fontigens</i> sp.....			2		
Undetermined.....			3		
Littorinidae (periwinkles):					
<i>Lacuna vincta</i>			3		
<i>Littorina angulifera</i>				1	
<i>irrorata</i>			3	1	
<i>litorea</i> (edible periwinkle).....			1		
<i>obtusata</i>			1		
<i>saxatilis</i>			12		
<i>silchana</i>					1
sp. undetermined.....			3	3	
Rissoidae:					
<i>Cingula minuta</i>				1	
sp. undetermined.....		1			
Cerithiidae:					
<i>Bititium alternatum</i>			1		
<i>varium</i>			6	2	
sp. undetermined.....			3	1	
<i>Diastoma</i> sp.....			2		
Undetermined.....				1	
Cerithiopsidae:					
<i>Seila terrebralis</i>			4		
Pyramidellidae:					
<i>Odostomia bisuturalis</i>			1		
sp. undetermined.....			4		
<i>Sayella producta</i>				1	
<i>Turbonilla</i> sp.....			3	1	
Naticidae (moon snails):					
<i>Polinices duplicata</i>				2	
<i>heros</i>			1		
Nassariidae (mud snails):					
<i>Nassarius obsoleta</i>			26	3	
<i>vibex</i>			3		
sp. undetermined.....			21	26	
Columbellidae:					
<i>Anachis avara</i>				1	
<i>Mitrella lunata</i>			2	2	
Turritidae:					
<i>Mangella ceroplasta</i>			1		
Acteocinidae:					
<i>Acteocina canaliculata</i>				3	1
Ellobiidae:					
<i>Melampus lineatus</i> (coffee bean snail).....		1	10	33	
sp. undetermined.....			4	4	
Lymnaeidae:					
<i>Fossaria obrussa</i>		3			
<i>Stagnicola palustris</i>				1	
Undetermined.....		13	1		1
Planorbidae:					
<i>Gyraulus parvus</i>		1			5
<i>Helisoma anceps</i>					1
<i>trivolis</i>		3		2	
<i>Planorbula armigera</i>		1			
Undetermined.....		2			2
Physidae:					
<i>Physa</i> sp.....		2			2
Undetermined.....	1	104	57	37	20
Pelecypoda (bivalves):					
Pectinidae (scallops):					
<i>Pecten</i> (sp.....			1		
Ostreidae (oysters):					
<i>Ostrea virginica</i>				1	
Mytilidae (mussels):					
<i>Modiolus demissus</i> (horse mussel).....			2		
<i>Mytilus edulis</i> (blue mussel).....			6	1	
Sphaeriidae:					
<i>Pisidium abditum</i>		1			
Veneridae:					
<i>Gemma gemma</i> (gem shells).....		1	10	7	
<i>Parastarte triquetra</i>				2	
<i>Venus mercenaria</i> (hard-shelled clam).....				1	
Undetermined.....			1		

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

ANIMAL FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long- billed dowitcher
MOLLUSCA—continued					
Pelecypoda (bivalves)—Continued.					
Donacidae (wedge shells):	Number	Number	Number	Number	Number
<i>Donax fossor</i>			11		
<i>variabilis</i>			89		
sp. undetermined.....			2		
Macluridae:					
<i>Mulinia lateralis</i>			2		
Undetermined.....		6	31	20	4
Undetermined Mollusca.....	1	50	20	25	4
ECHINODERMATA					
Echinoidea (sea urchins).....			1		
PISCES					
Argentiniidae (argentines):					
<i>Argentina</i> sp.....					2
Cyprinodontidae (killifishes):					
<i>Fundulus</i> sp.....		5			
Undetermined Pisces.....		55	6	5	1
AMPHIBIA					
Mutabilia (salamanders):					
Plethodontidae:					
<i>Plethodon</i> sp.....	1				
Undetermined.....	1	1			
Linguata:					
Ranidae (frogs):					
<i>Rana</i> sp.....		1			
Undetermined.....	1	2			
Undetermined.....		2			
REPTILIA					
Sauria (lizards):					
Iguanidae:					
<i>Anolis carolinensis</i> (chameleon).....		1			
Scincidae:					
<i>Eumeces fasciatus</i> (blue-tailed skink).....		2			

PLANT FOOD

THALLOPHYTA					
Algae:					
Desmidiaceae (desmids).....		1			
Characeae: <i>Chara</i> sp. (muskgrass).....	1	1			
Undetermined.....		2			
Fungi:					
Ascomycetes.....		1			
BRYOPHYTA					
Musci (mosses).....			3		
PTERIDOPHYTA					
Marsileaceae:					
<i>Potamogeton americanus</i> (potamogeton).....		1			
Equisetaceae:					
<i>Equisetum</i> sp. (horsetails).....		1			
SPERMATOPHYTA					
Pinaceae:					
<i>Pinus taeda</i> (loblolly pine).....		2			
Sparganiaceae (burreeds):					
<i>Sparganium eurycarpum</i> (giant burreed).....		1			
<i>minimum</i>	1				
sp. undetermined.....	1	38		2	4
Najadaceae:					
<i>Najas flexilis</i> (northern naiad).....	1	1			
sp. undetermined.....		2	2		
<i>Potamogeton pectinatus</i> (sago pondweed).....					
sp. undetermined.....		74	5	32	2
<i>Ruppia maritima</i> (wigeongrass).....		8	29	32	41
<i>Zannichellia palustris</i> (horned pondweed).....			1		6
<i>Zostera marina</i> (eelgrass).....			4		4
Undetermined.....		1			

TABLE 2.—*Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued*

PLANT FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long-billed dowitcher
SPERMATOPHYTA—continued					
Juncaginaceae:	Number	Number	Number	Number	Number
<i>Triglochin</i> sp. (arrowgrass).....		52			2
Gramineae (grasses):					
<i>Agrostis</i> sp. (bentgrass).....	1	1			
<i>Alopecurus alpinus</i> (alpine foxtail).....			1		
<i>Andropogon glomeratus</i> (bushy broomsedge).....	1				
<i>Avena sativa</i> (oats).....		1			
<i>Cenchrus</i> sp. (sandbur).....		1			
<i>Dactyloctenium aegyptium</i> (crowfoot grass).....	1				
<i>Digitaria filiformis</i>	3	1			
<i>sanguinalis</i> (crabgrass).....	1	1			
sp. undetermined.....	2	4			
<i>Distichlis spicata</i> (saltgrass).....					2
<i>Echinochloa crusgalli</i> (wild millet).....	5	44			1
sp. undetermined.....		1			
<i>Eleusine indica</i> (goosegrass).....		2			
<i>Eragrostis</i> sp. (lovegrass).....		4			
<i>Glyceria striata</i> (mannagrass).....	2				
<i>Leersia oryzoides</i> (rice cutgrass).....		2			
sp. undetermined.....		6			
<i>Lolium multiflorum</i> (Italian ryegrass).....			1		
<i>Monanthochloe littoralis</i> (salt-flat grass).....		2	1		
<i>Panicum capillare</i> (witchgrass).....	2	10			
sp. undetermined.....	27	39			2
<i>Paspalum boscianum</i> (bull paspalum).....		2			
sp. undetermined.....	5	23			
<i>Phalaris</i> sp. (canary grass).....		1			
<i>Phippsia</i> sp.....			1		
<i>Poa</i> sp. (bluegrass).....	2	3	2		
<i>Setaria lutescens</i> (pigeongrass).....	13	13		1	1
<i>viridis</i> (pigeongrass).....	5	6			
sp. undetermined.....	5	8			
<i>Sorghum halepense</i> (Johnson grass).....		1			
<i>Triticum aestivum</i> (wheat).....	1				
<i>Zea mays</i> (corn).....	1	1			
Undetermined.....	14	63	4	4	
Cyperaceae (sedges):					
<i>Carex decomposita</i> (sedge).....		2			2
<i>stricta</i> (sedge).....	1				
sp. undetermined.....	104	201	3	8	15
<i>Cyperus</i> sp.....	13	59		1	
<i>Eleocharis ovata</i> (spikerush).....		1			
sp. undetermined.....		25			2
<i>Fimbristylis</i> sp.....	1	1			
<i>Mariscus jamaicensis</i> (sawgrass).....		4			
<i>mariscoides</i>		1			
sp. undetermined.....		88	1	5	1
<i>Psilocarya</i> sp. (baldrush).....	5				
<i>Rhynchospora</i> sp. (beakrush).....	5	21		1	1
<i>Scirpus carinatus</i> (bulrush).....		2			
<i>fluvialis</i> (river bulrush).....		15		1	
<i>paludosus</i> (alkali bulrush).....					22
<i>robustus</i> (saltmarsh bulrush).....		8		3	
sp. undetermined.....	12	249	9	28	18
<i>Scleria</i> sp. (nut rush).....		4			
Undetermined.....	9	185	2	6	7
Lemnaceae:					
<i>Lemna minor</i> (duckweed).....					1
sp. undetermined.....		8			
<i>Spirodela polyrrhiza</i> (big duckweed).....		3			
Undetermined.....		5			
Juncaceae:					
<i>Juncus</i> sp. (rush).....	7	6			
<i>Luzula</i> sp. (woodrush).....		1			
Iridaceae:					
<i>Iris</i> sp. (iris).....		1			
Salicaceae:					
<i>Salix</i> sp. (willow).....		1	1		
Myricaceae:					
<i>Myrica carolinensis</i> (bayberry).....				7	
<i>cerifera</i> (waxmyrtle).....			1		
sp. undetermined.....		21	4	33	
Betulaceae:					
<i>Alnus</i> sp. (alder).....	16	2			
<i>Betula</i> sp. (birch).....	8	1			
<i>Carpinus caroliniana</i> (hornbeam).....	1				

TABLE 2.—*Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued*

PLANT FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long-billed dowitcher
SPERMATOPHYTA—continued					
Urticaceae:	Number	Number	Number	Number	Number
<i>Ficus</i> sp. (fig).....		1			
<i>Morus</i> sp. (mulberry).....				1	
<i>Ulmus</i> sp. (elm).....	1				
Polygonaceae:					
<i>Polygonum amphibium</i> (water smartweed).....		16			
<i>arifolium</i> (tearthumb).....		5			
<i>aviculare</i> (knotweed).....	2	1			1
<i>convolvulus</i> (black bindweed).....		1			
<i>hydropiper</i> (waterpepper).....		19		1	
<i>hydropiperoides</i> (swamp smartweed).....		3			
<i>lapathifolium</i> (noddling smartweed).....	2	2			1
<i>pensylvanicum</i> (largeseed smartweed).....	1	2			1
<i>persicaria</i> (ladythumb).....	1	1			
<i>portoricense</i> (smartweed).....		6			
<i>sagittatum</i> (tearthumb).....		20			
sp. undetermined.....	36	267	1	4	3
Chenopodiaceae:					
<i>Atriplex patula</i> (saltbush).....	1				
sp. undetermined.....	2				
<i>Chenopodium</i> sp. (goosefoot).....	2	1	1		
Amaranthaceae:					
<i>Amaranthus</i> sp. (pigweed).....	5	4			
Aizoaceae:					
<i>Mollugo verticillata</i> (carpetweed).....	1				
Caryophyllaceae:					
<i>Cerastium</i> sp. (mouse-ear chickweed).....			1		
Undetermined.....	2				
Portulacaceae:					
<i>Calandrinia</i> sp. (rockpurslane).....		1			
<i>Montia fontana</i> (blinks).....					2
<i>Portulaca oleracea</i> (purslane).....	1				
sp. undetermined.....	3	2			
Ceratophyllaceae:					
<i>Ceratophyllum demersum</i> (coontail).....		2		2	1
Nymphaeaceae:					
<i>Brasenia schreberi</i> (watershield).....		3			
<i>Nuphar advena</i> (spatterdock).....					1
sp. undetermined.....		3			
<i>Nymphaea tuberosa</i> (waterlily).....		1			
sp. undetermined.....		1			
Ranunculaceae:					
<i>Ranunculus</i> sp. (buttercup).....	3	3			
Cruciferae:					
<i>Radicula</i> sp. (cress).....					1
Undetermined mustard.....	1				
Rosaceae:					
<i>Amelanchier</i> sp. (serviceberry).....	2				
<i>Crataegus</i> sp. (hawthorn).....	1	2			
<i>Duchesnea indica</i> (mock-strawberry).....	4				
<i>Fragaria</i> sp. (strawberry).....	8	1			
<i>Physocarpus opulifolius</i> (ninebark).....		2			
<i>Potentilla</i> sp. (cinquefoil).....	31		1		6
<i>Prunus virginiana</i> (chokecherry).....		2			
sp. undetermined.....	3	2			
<i>Rosa</i> sp. (rose).....		2		1	
<i>Rubus chamaemorus</i> (cloudberry).....		5		2	7
sp. undetermined.....	102	4		5	
Leguminosae (legumes):					
<i>Amphicarpaea</i> sp. (hogpeanut).....	1				
<i>Chamaecrista</i> sp. (partridge-pea).....		1			
<i>Lespedeza striata</i> (Japan clover).....		1			
sp. undetermined.....	1	1			
<i>Lupinus</i> sp. (lupine).....		1			
<i>Medicago</i> sp. (medick).....					1
<i>Sesbania macrocarpa</i> (sesbania).....		1			
<i>Strophostyles</i> sp. (wild bean).....		1			
<i>Trifolium hybridum</i> (alsike clover).....	1				
<i>pratense</i> (red clover).....	1				
<i>repens</i> (white clover).....	1				
sp. undetermined.....	5	4			
<i>Vicia sativa</i> (vetch).....		1			
Undetermined.....	1	4			

TABLE 2.—Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued

PLANT FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long- billed dowitcher
SPERMATOPHYTA—continued					
Oxalidaceae:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
<i>Oxalis stricta</i> (oxalis).....	1				
sp. undetermined.....	4				
Euphorbiaceae:					
<i>Euphorbia preslii</i> (spurge).....	1				
sp. undetermined.....	1				
Undetermined.....	1				
Empetraceae:					
<i>Empetrum nigrum</i> (crowberry).....		1		2	2
Aquifoliaceae:					
<i>Ilex verticillata</i> (winterberry).....	3				
sp. undetermined.....		4		1	
Vitaceae:					
<i>Vitis</i> sp. (grape).....	3	3		1	
Malvaceae:					
<i>Hibiscus palustris</i> (rosemallow).....		1			
<i>Sida</i> sp.....		1			
Violaceae:					
<i>Viola</i> sp. (violet).....	50	7			
Cactaceae:					
<i>Opuntia</i> sp. (pricklypear).....		1			
Lythraceae:					
<i>Cuphea petiolata</i> (clammy cuphea).....		1			
Onagraceae:					
<i>Jussiaea leptocarpa</i> (water-primrose).....		1			
Haloragidaceae:					
<i>Hippuris vulgaris</i> (maretail).....		13		6	9
sp. undetermined.....	1				
<i>Myriophyllum</i> sp. (watermilfoil).....		9		5	1
<i>Proserpinaca palustris</i> (mermaidweed).....		4			
sp. undetermined.....		10		1	
Araliaceae:					
<i>Aralia</i> sp.....	1				
Umbelliferae:					
<i>Centella asiatica</i> (centella).....		12			
Cornaceae:					
<i>Cornus canadensis</i> (bunchberry).....		1			
sp. undetermined.....		4			1
<i>Nyssa sylvatica</i> (blackgum).....		1			
Ericaceae:					
<i>Arctostaphylos uva-ursi</i> (bearberry).....		4			
<i>Gaylussacia</i> sp. (huckleberry).....	2	8			3
<i>Vaccinium</i> sp. (blueberry).....	4				
Gentianaceae:					
<i>Menyanthes trifoliata</i> (bogbean).....		135	3	18	12
Convolvulaceae:					
<i>Cuscuta</i> sp. (dodder).....	3				
Undetermined.....	1				
Boraginaceae:					
<i>Heliotropium indicum</i> (heliotrope).....		3			
Verbenaceae:					
<i>Lippia lanceolata</i> (lippia).....		3		1	
sp. undetermined.....	1	5			
<i>Verbena</i> sp.....	2	15			1
Labiatae (mints):					
<i>Lycopus</i> sp. (bugleweed).....		3			
<i>Mentha canadensis</i> (wild mint).....		3			
<i>Nepeta</i> sp.....		1			
<i>Prunella vulgaris</i> (selfheal).....	1				
<i>Trichostema dichotomum</i> (bluecurls).....	1	1			
Undetermined.....		1			
Solanaceae:					
<i>Solanum</i> sp. (nightshade).....	7	3			
Plantaginaceae:					
<i>Plantago</i> sp. (plantain).....	7				
Rubiaceae:					
<i>Cephalanthus occidentalis</i> (buttonbush).....		4			
<i>Diodia teres</i> (buttonweed).....	1	5			
<i>Galium</i> sp. (bedstraw).....	17	43			6
Caprifoliaceae:					
<i>Lonicera</i> sp. (honeysuckle).....	1				
<i>Sambucus canadensis</i> (elder).....	2				
sp. undetermined.....	12				
<i>Viburnum</i> sp.....		1			

TABLE 2.—*Systematic list of foods found in 1,639 stomachs of 5 shorebirds and the number of stomachs in which found—Continued*

PLANT FOOD—Continued

Food item	American woodcock	Wilson's snipe	American knot	Eastern dowitcher	Long-billed dowitcher
SPERMATOPHYTA—continued					
Cucurbitaceae	Number 1	Number	Number	Number	Number
Compositae (composites):					
<i>Ambrosia artemisiifolia</i> (ragweed)	17	28			
sp. undetermined	5	18			
<i>Anthemis</i> sp. (camomile)	1				
<i>Bidens</i> sp. (beggarticks)		5			
<i>Cirsium</i> sp. (thistle)		1			
<i>Helianthus</i> sp. (sunflower)		7			
<i>Taraxacum</i> sp. (dandelion)		1			
<i>Xanthium</i> sp. (cocklebur)	1	2			2
Undetermined	9	8			1
Undetermined Spermatophyta:					
Foliage	1				
Plant debris	3				
Plant fiber			6		10
Rootlets	4				
Seeds	4		2	1	1

SUMMARY

The food of 5 North American shorebirds of 4 species—the American woodcock, Wilson's snipe, the American knot, and the eastern and long-billed dowitchers—as here summarized, is based on the laboratory examinations of 1,639 stomachs, 1,536 of which were used in the computation of food percentages. According to foreign writers, the food of 2 Old World shorebirds—the European woodcock and the great snipe—stragglers to North America, is apparently much the same as that of the related American species.

The five birds are predominantly animal feeders, as more than four-fifths of the food of each (nearly nine-tenths of that of the woodcock and of the eastern dowitcher) was derived from the animal kingdom, both injurious and beneficial forms having been taken. The kind and quantity of animal material consumed varied with the habitat. Insects were the most important food for the dowitchers and jacksnipe, earthworms for the woodcock, and mollusks for the knot. The animal foods taken are discussed in systematic order.

Marine worms (Polychaeta: Chaetopoda), mostly clamworms, which are enemies of clams, oysters, and other shellfishes, were found in all but the woodcock stomachs. They were the second most important food of the eastern dowitcher, contributing more than a fourth of its subsistence, a proportion greater than is known for any other bird and the more remarkable because 20 of the 21 April and June birds were collected in localities remote from the seashore and had not eaten any of these worms. Polychaeta were relatively unimportant for the long-billed dowitcher, however, and were taken only sparingly by the jacksnipe and the knot.

Earthworms (Lumbricidae), an intermediate host of the gapeworm of chicks, were recorded only for the woodcock and jacksnipe. They furnished more than two-thirds of the woodcock's diet, having been found in 223 of the 261 tabulated stomachs, 63 of which contained little or no other food, but contributed only a little more than a tenth of the jacksnipe's food.

Insects, consumed abundantly by all five birds, were the dominant food of the dowitchers and jacksnipe, supplying more than seven-tenths of the food of the long-billed dowitcher, which reflects its habit of feeding in the vicinity of inland lakes and marshes; about half that of the jacksnipe; and nearly a third that of the eastern dowitcher. They were the second most valuable food of the woodcock and knot, averaging almost a fifth of the diet of the former and a trifle more than a seventh of that of the latter. The chief insect food of each bird consisted of flies (Diptera), largely maggot and larval forms, and the next most important of beetles (Coleoptera). As to destructive insects, the woodcock consumed wireworms, which are injurious to grain, strawberry, and other crops; larvae of leaf chafers (*Euphoria*), the adults of which sometimes greatly damage roasting ears, peaches, grapes, and apples; predaceous diving beetles (Dytiscidae); and cutworms (Noctuidae). The jacksnipe ate the larvae and nymphs of some of the more destructive aquatic insects, among them Dytiscidae and water scavenger beetles (Hydrophilidae), giant water bugs (Belostomatidae), and dragonflies (Odonata), all frequently a serious menace to young fishes. The knot and the dowitchers derived most of their beetle food from the water scavenger and predaceous diving forms.

Crustaceans were eaten by all five birds, but only small forms of no economic value were taken. Although second in importance in the animal diet of both the jacksnipe and long-billed dowitcher, they contributed only a little more than a tenth of the food of the former and only about a fourteenth of that of the latter. For the knot they supplied only a little more than a fifteenth of the food; for the eastern dowitcher, less than a sixteenth; and for the woodcock, only 1.02 percent.

Eggs of the king, or horseshoe, crab (*Limulus polyphemus*) were an important source of food for the knot and eastern dowitcher during May, June, and July but were not recorded for the other birds.

Mollusks were recorded for all 5 birds. Small, economically unimportant forms were taken, both univalves and bivalves, but more and a greater variety of the former, in accordance with their greater abundance. Mollusks were by far the most important food of the knot, as they furnished practically three-fifths of its diet and occurred in all but 18 of the 226 stomachs examined. They were the third most valuable food of the eastern dowitcher, contributing about a

fifth of its subsistence, but were relatively unimportant for the jack-snipe and long-billed dowitcher and were found in only 2 woodcock stomachs.

A few small fishes were eaten by the snipe, knot, and dowitchers, but the total consumption was insignificant and the forms taken are not of value for human food.

The plant food of each bird consisted largely of seeds of various marsh and aquatic plants but included some vegetable debris, which seemed often to have been of adventitious occurrence, taken not intentionally but incidentally along with other food. The seeds furnishing percentages of importance were those of sedges (chiefly *Scirpus*, *Carex*, and *Mariscus*) and bogbean for the jacksnipe and of wigeongrass, bogbean, and goosefoot (*Chenopodium*) for the knot.

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